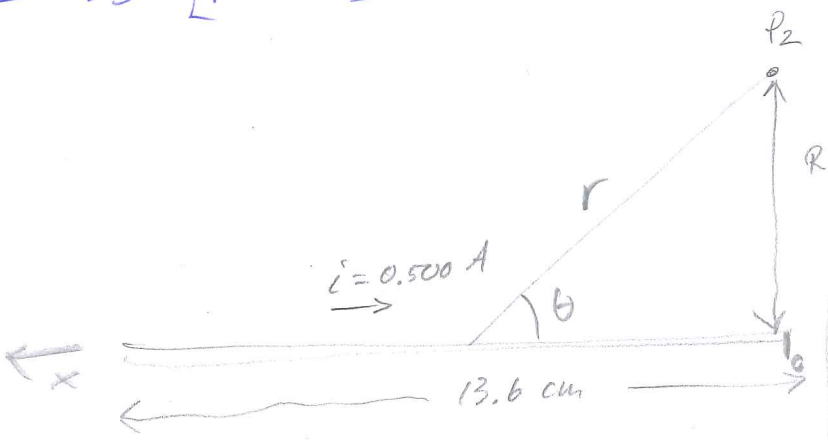
29.3 [p. 767]



$$\begin{cases} r = \sqrt{x^2 + R^2} \\ \sin\theta = \frac{R}{r} \end{cases}$$

a) $$B = \frac{\mu_0 i}{4\pi} \int_0^L \frac{\sin\theta}{r^2}\, dx = \frac{\mu_0 i R}{4\pi} \int_0^L \frac{dx}{(x^2+R^2)^{3/2}} = \left[\text{tex Wolfram alpha}\right]$$

$$= \frac{\mu_0 i R}{4\pi}\left[\frac{x}{R^2\sqrt{R^2+x^2}}\right]_0^L = \frac{\mu_0 i}{4\pi R}\frac{L}{\sqrt{R^2+L^2}}$$

$$= \frac{1.257\cdot 10^{-6}\cdot 0.500\cdot 0.136}{4\pi\cdot 0.251\sqrt{0.251^2+0.136^2}} \approx 9.49\cdot 10^{-8}\ T$$

b) The result from 29.1 is

$$B = \frac{\mu_0 i}{2\pi R}\frac{L}{\sqrt{L^2+4R^2}} = \frac{1{,}257\cdot 10^{-6}\cdot 0.5\cdot 0.136}{2\pi\cdot 0.251\sqrt{0.136^2+4\cdot 0.251^2}} \approx 1{,}04\cdot 10^{-7}\ T$$

$\Rightarrow$ increase

Since: "more parts closer"